Global Action Plan to minimize poliovirus facility-associated risk in the post-eradication / post-OPV era

World Health Organization

Development process for *Global Action Plan* (1)

Development has taken place over last 3 years and involved:

- **Extensive review of the literature**
- **Consultations with**
  - **Polio virologists and epidemiologists**
  - **Biosafety experts**
  - **Risk management experts from other hazard industries (petroleum, shipping)**

Development process for *Global Action Plan* (2)

Development has taken place over last 3 years and involved:

- **Presentation and review by meetings / conferences:**
  - **Meetings of the American, Brazilian, and Asia Pacific Biosafety Associations (ABSA, APBA, AnBio)**
  - **Global and Regional meetings of the Polio Laboratory Network**
  - **Advisory Committee on Polio Eradication (ACPE)**
  - **International Association for Biological Standardization (IABS)**
  - **Annual meetings of polio vaccine producers**

Development process for *Global Action Plan* (3)

The *Global Action plan* is based on:

- **Analysis of essential uses of poliovirus in the post eradication world**
- **Assessment of the consequences of a poliovirus reintroduction**
- **Identification and assessment of the risks of a facility based reintroduction**
- **Tailored risk management strategies**

Essential needs for polioviruses

After interruption of wild poliovirus circulation, are polioviruses needed to maintain a polio free world? YES!

Facility based polioviruses will be essential for:

- **Vaccine production**
- **Stockpiles**
- **Vaccine quality assurance**
- **Diagnostic reagent production**
- **Reference**
- **Research (diagnostics, anti-virals, etc.)**

Summary of consequences of poliovirus reintroduction#

- After interruption of WPV circulation, non-immune populations will increase particularly in areas with poor routine immunization
- After OPV cessation, countries will be a combination of those that continue high IPV coverage, achieve sub-optimal IPV coverage, and discontinue all polio immunization with varying levels of additional non-immune populations
- Severity of reintroduction of poliovirus increases with time from cessation:
  - Low immunization coverage and hygiene
  - High population density
  - Tropical climate
- Consequence of wild PV reintroduction >> Sabin

Fine PEM, Ritchie S. (2006). *Perspective: Determinants of the severity of poliovirus outbreaks in the post eradication era*. Risk Analysis, 26(6): 1533-1540

Summary of risks of poliovirus reintroduction*

- Titre of poliovirus infectious materials in facilities exceeds estimated infectious dose for both wild and Sabin materials
- Routes of infection and methods for prevention are the same for both types of polioviruses (wild & Sabin)
- Greatest risk of reintroduction is infected / contaminated facility personnel

* Dowdle W, et.al. (2006). *Containment of poliovirurses after eradication and OPV cessation: characterizing risks to improve management*. Risk Analysis 26 (6): 1449- 1469

Conclusions from assessments

- Facility based polioviruses necessary in post eradication era
- *Very low tolerance* for post-eradication reintroduction of any poliovirus (wild or Sabin)
  - Growing susceptible populations
  - Capacity for rapid global spread as seen in 2004-2006 outbreaks in polio free areas
  - Clinical severity in some recent outbreaks (Namibia, Cape Verde)
  - Unnecessary compromise of a 20 year, 4+ billion USD global investment

Risk management

Lessons from biosafety professionals and other hazard industries:

- Eliminate unnecessary risk
- Manage remaining risks
- Reduce consequences

World Health Organization

Global action plan to minimize poliovirus risk
Strategy

- Eliminate risk through destruction and prohibition of PV material except in essential facilities in a minimum number of countries
- Manage risk of essential facilities through
  - primary safeguards of containment
  - secondary safeguards of location

Global Action Plan to minimize polio risk
Goal

To minimize the risk of poliovirus re-introduction in the post eradication/OPV era by reducing the number of poliovirus facilities to an absolute minimum (<20) worldwide serving essential international vaccine, reference, and research functions and meeting the primary safeguards of facility containment and secondary safeguards of location in areas of lowest population risks.

GAP III – risk management
Primary safeguards for essential facilities

- Facility design, construction, and operation
- Biorisk management (containment)
- Immunization (IPV) of personnel
- Reduced use of live WPV, with Sabin substituted where possible
- Contingency plans for containment breach
- Institutional, national, international oversight

Global action plan to minimize poliovirus risk
Secondary safeguards for countries with essential facilities

Essential facilities located in areas with:

1. low seasonal enterovirus transmission rates

2. closed sewage system with at least secondary effluent treatment

3. high (>90%) routine IPV national population coverage

GAP III – overview
Phases

National WPV transmission stopped

Phase I: National survey and wild poliovirus inventory

- **Survey all biomedical facilities to identify those with WPV materials and encourage destruction of unneeded materials**
- **Establish a national inventory of facilities retaining WPV materials**

National completion of Phase I

Phase II: National long-term poliovirus policy and regulation

- **Establish national policy on retention of polio materials after eradication and OPV cessation**

Most Countries

Countries with essential facility meeting primary/secondary safeguards

Risk Elimination

1 year w/o polio reported globally

Phase III

- **Notify laboratory community that WPV retention is now prohibited**
- **Plan for Phase IV**

At the time of global OPV cessation

Phase IV

- **Notify laboratory community that retention of poliovirus is prohibited**

Risk Management

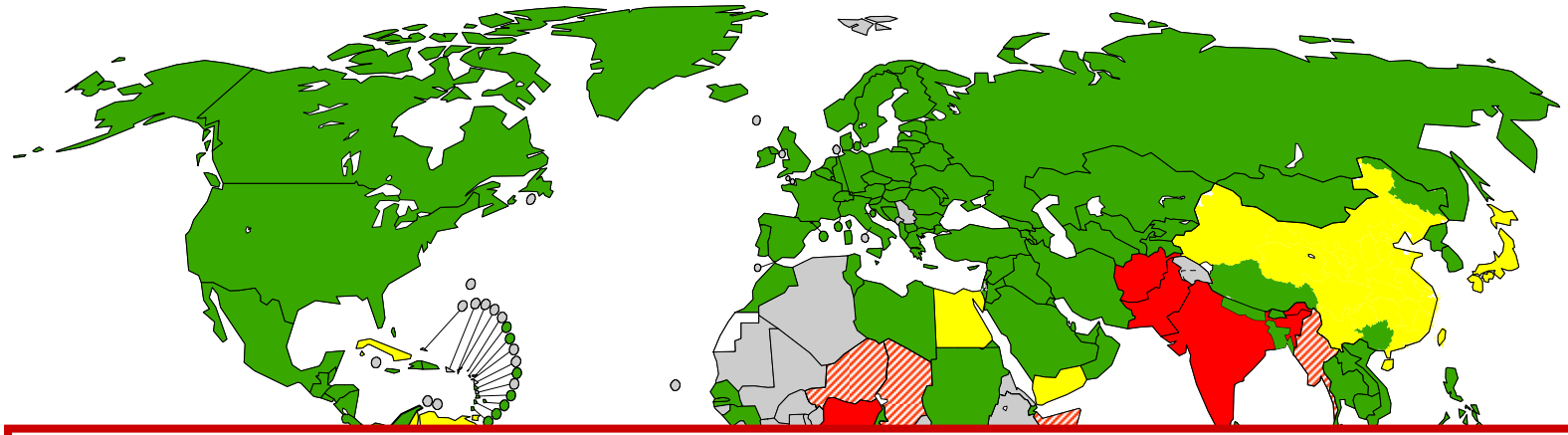
Phase III

- **Notify laboratory community that WPV retention is prohibited *except* in approved essential facilities**
- **Facilities implement BSL-3/polio**
- **International accreditation**
- **Plan for Phase IV**

Phase IV

- **Notify laboratory community that retention of poliovirus is prohibited except approved essential facilities**
- **Containment (BSL-3/polio) or control of all polio materials**

Current status of Phase I implementation



Experience to date:

- countries and laboratories are cooperating with efforts for containment
- 220,000+ facilities contacted to date
- <500 identified with WPV materials
- many facilities have identified "unneeded" materials and destroyed them
- documented cases of mis-labelled or mis-identified virus stocks

Global Action plan to minimize poliovirus risk
Annexes

1. Definitions
2. Draft regulatory framework for countries with no planned essential facilities
3. Draft regulatory framework for countries with planned essential facilities
4. Management standard for essential poliovirus facilities (modified BSL-3/polio)
5. Framework for international accreditation of poliovirus facilities

Global Action plan to minimize poliovirus risk
Next Steps

- Review and feedback from participants of this meeting (comments greatly appreciated)
- Review by stakeholders – Quarter 4 and 1 2007-8
  - Biosafety, scientific, vaccine manufacturing and regulatory, international public health, universities, national polio containment coordinators, Global polio laboratory network
- Finalization of document and incorporation into post eradication planning process – Quarter 2 2008

THANK YOU

EXTRA SLIDES

The agent: poliovirus
Difference between wild and vaccine strain

A

Wild PV

Population income or hygiene standard	R_0	Prevalence of immunity against infection				
		0 %	25 %	50 %	75 %	100 %
Low	*20*	**20**	**15**	**10**	**5**	**0**
Medium	*10*	**10**	**7.5**	**5**	**2.5**	**0**
High	*3*	**3**	**2.25**	**1.5**	**0.75**	**0**

B

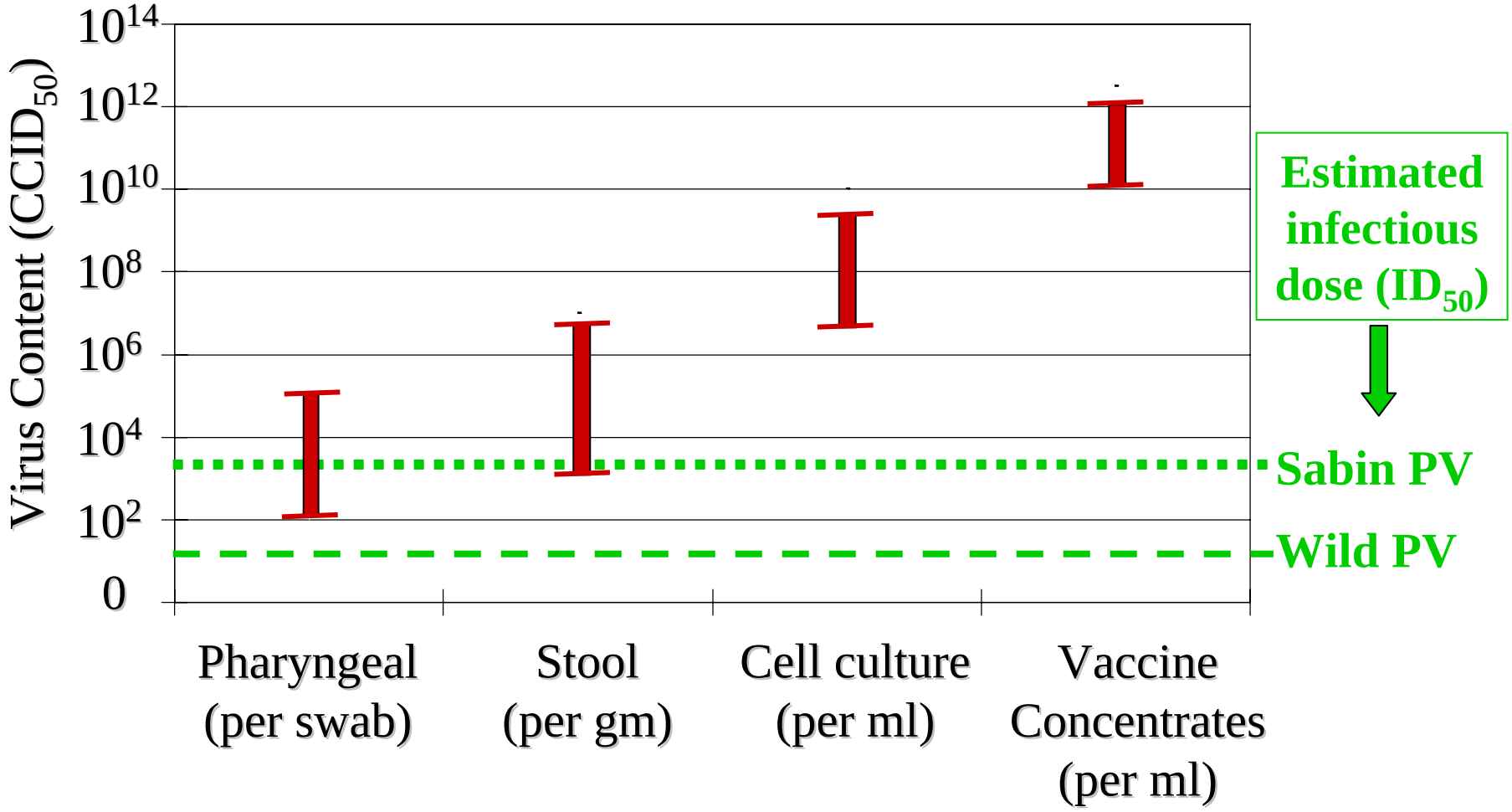
Sabin PV

Population income or hygiene standard	R_0	Prevalence of immunity against infection				
		0 %	25 %	50 %	75 %	100 %
Low	*4*	**4**	**3**	**2**	**1**	**0**
Medium	*2*	**2**	**1.5**	**1**	**0.5**	**0**
High	*0.5*	**0.5**	**0.375**	**0.25**	**0.125**	**0**

Fine P. Consequence Assessment of Poliovirus Release. WHO Draft Document.

Poliovirus in facilities
Estimated PV content and infectious dose

Estimated poliovirus (wild and Sabin) content of materials



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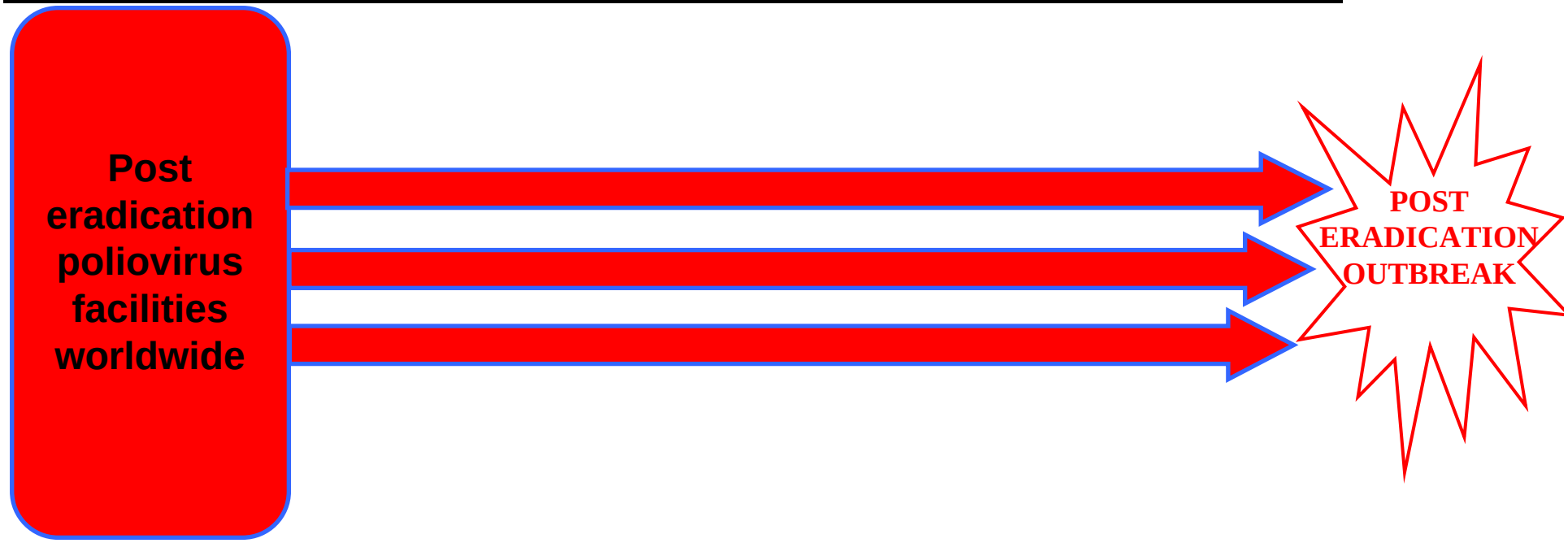
Strategy



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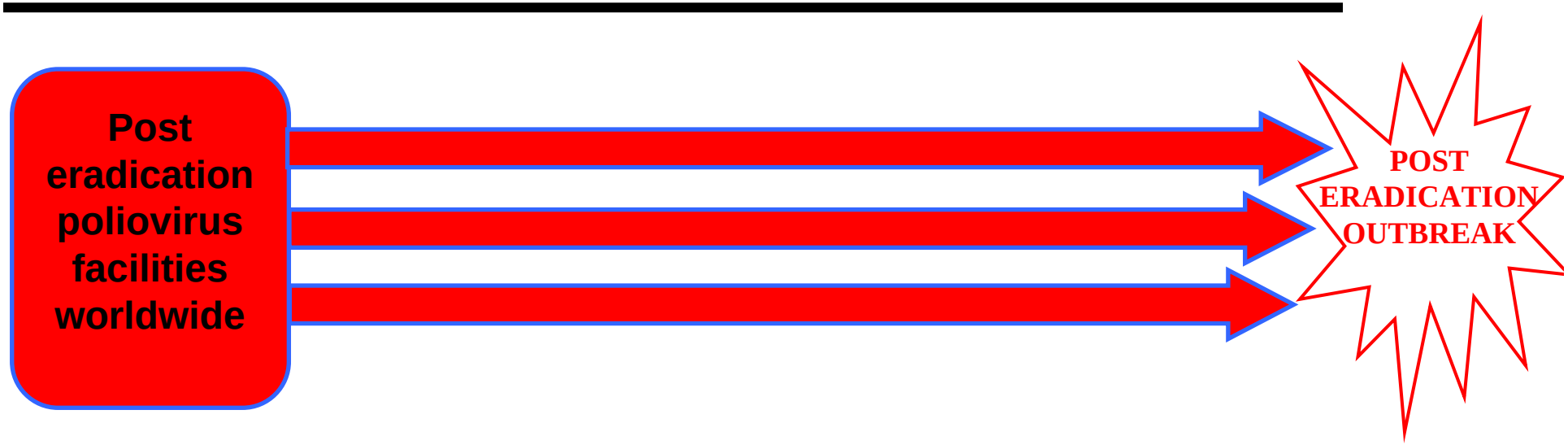
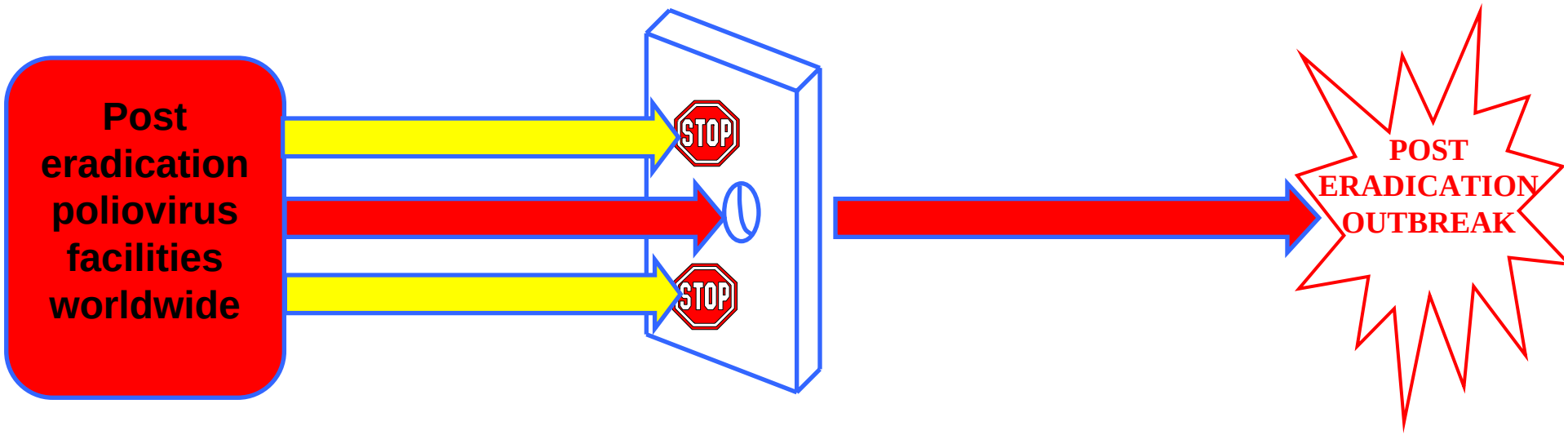
Strategy



1. Risk elimination

- Global reduction in the number of poliovirus facilities (<20 worldwide by the time of OPV cessation)

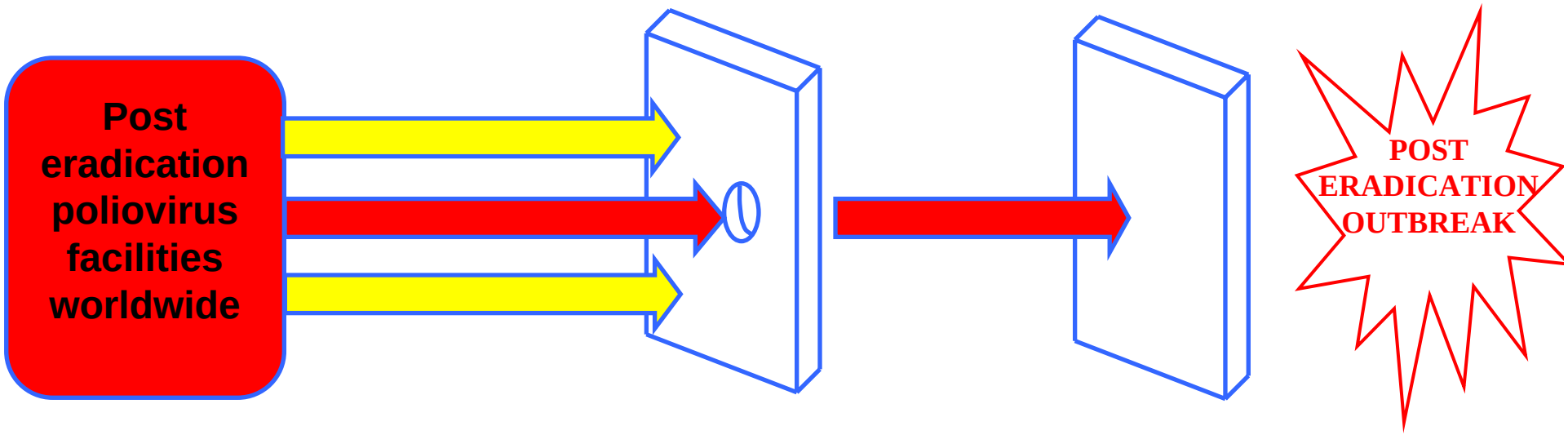
Global action plan to minimize poliovirus risk
Strategy



1. Risk elimination
- Global reduction in the number of poliovirus facilities (<20 worldwide by the time of OPV cessation)

2. Primary safeguards
- containment
- substitution of wild with Sabin strains
- immunization of facility personnel
- emergency response plans
- national & int'l oversight

Global action plan to minimize poliovirus risk
Strategy



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3. Secondary safeguards

Locate facilities in areas with
- high IPV coverage
- low seasonal enterovirus circulation
- high quality closed sewage systems